Effects of Heat on Celluloid and Similar Materials

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COMBUSTIBILITY

The term "combustibility" may mean either the ease with which combustion is started or the rate at which it proceeds after starting. As is well known, these are entirely different things. The definition of the ignition temperature is uncertain, as in the case of materials which give off combustible gas on heating; the ignition temperature is that of a mixture of the gas with varying amounts of air, rather than of the solid itself. In this respect celluloid resembles wood, but the temperature of decomposition is much lower than that of wood, as is also the ease with which it may be ignited. It is not possible to set fire to a pine board by holding a match to its upper surface, yet we have frequently easily and permanently ignited a heavy plate of celluloid, one-half inch thick, by holding a burning match to its upper surface. It is possible to ignite a plate of sealing wax in the same way, but unlike celluloid the flame does not spread and dies out in a few moments.

If by "combustibility" is meant the rate at which a flame once started is propagated, then it is shown by the results of our experiments that a thin stick of celluloid is five to ten times as combustible as a wooden stick of the same size under the same conditions. We soon reach the limit of size of a wooden stick which can readily be ignited and which will continue to burn if held horizontally, while a larger stick of celluloid will burn easily.

In any sense, therefore, celluloid is much more combustible than wood under similar conditions, and the flame is not as easily extinguished. It is not the celluloid which burns, but the gas evolved from it, just as is the case with other materials burning with flame. While wood has to be heated either from without or by its own combustion to cause it to give out inflammable gas, celluloid, if in a confined space, generates by itself enough heat to support a decomposition once started, entirely apart from actual combustion. It is therefore impossible to stop the progress of decomposition by shutting off the air, and inflammable gas will continue to be generated. Celluloid has been ignited with no greater initial source of heat than an air bath at 135° C. (275° F.) and has been caused to set fire to cotton and to its own gas, using no source of heat other than a steam coil at 120° C. (248° F).

It should be distinctly understood that this Bureau is not expressing the opinion that "celluloid" and pyroxylin plastics in general constitute an unusual source of danger in use. It would be no more just to condemn them in this connection than it would be to warn the public against the use of petroleum, of cotton fabrics, and the like. It is, however, right that the very inflammable nature of these materials should be known, as they fill a very important place, and it can only be urged that the same intelligence be used in handling them as is used in handling other highly combustible materials which are to be found in every house or which are worn on the person.

There was found to be no essential difference in composition and behavior between the products of the two American firms whose material was examined or between these and goods of foreign manufacture. Some samples are more stable than others, but this has no connection with the source. We therefore regard the different makes of pyroxylin plastics that were obtainable in 1908, so far as we have examined them, as on the average equally safe, or unsafe, as the case may be.

Tobacco, Fleas and Plague

In an interesting paper under the above title in the February number of the *Indian Medical Gazette*, Mr. S. Mallanah, of Hyderabad, Deccan, reports that tobacco kills fleas practically instantaneously, and his suggestion is that tobacco leaves can be used as a preventive measure which will stamp out plague. He finds that when tobacco leaves are spread over the floors of houses where people sleep the fleas as they enter the rooms perish, with the result that there is no subsequent infection. In his investigations some 52 houses in highly infected areas were "tobaccoed" according to his method. The leaves were stitched on to a piece of matting and laid on the floor. The same number of houses of the same type and in close proximity were left untouched as controls. In spite of the fact that the floor was strewn with tobacco, plague here and there did break out—a fact which the writer attributes to faulty technique, while the number of houses tobaccoed which enjoyed complete immunity was certainly remarkable. Out of 52 houses which were tobaccoed only one house got infected (and that, it is stated, not through the fault of the tobacco), and out of 52 control houses seven got infected, which shows that the tobacco apparently failed in 14.2 per cent of cases and succeeded in preventing plague in 85.8 per cent of the cases under experiment. In conclusion, the writer expresses his firm belief that if the Government spent a fraction—he suggests one-eighth—of what it has actually spent in carrying out his method it would "save the misery and devastation of thousands of homes caused by the appalling death-rate from this calamity." Tobacco, of course, is a well known insecticide, but we are not aware that it has before been reported as being so prompt and effected a pulicide.—*The Lancet.*

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